U. S. Department of Commerce
Malcolm Baldrige
Secretary

National Bureau of Standards
Ernest Ambler, Director

National Bureau of Standards

Certificate of Analysis

Standard Reference Material 360b

Zircaloy-4

(In Cooperation with the American Society for Testing and Materials)

This Standard Reference Material (SRM) is in the form of chips sized between 0.50 and 1.18 mm sieve openings (35 and 16 mesh). It is intended for use primarily in chemical methods of analysis.

Element	Certified Value[1] % by Weight	Estimated[2] Uncertainty	Element	Certified Value[1] % by Weight	Estimated[2] Uncertainty
Aluminum	0.004	0.002	Molybdenum	<0.001	- - -
Boron	<0.0005	- - -	Nickel	0.0025	0.0010
Cadmium	<0.0001	- - -	Niobium	<0.005	- - -
Cobalt	<0.001	- - -	Tantalum	<0.01	- - -
Copper	0.002	0.001	Tin	1.55	0.03
Chromium	0.10	0.01	Titanium	0.002	0.001
Hafnium	0.008	0.001	Tungsten	<0.005	- - -
Iron	0.21	0.01	Carbon	0.011	0.003
Manganese	0.0010	0.0005	Nitrogen	0.0045	0.0007

[1]The certified value listed for a constituent is the present best estimate of the "true" value based on the results of the cooperative program for certification.

[2]The estimated uncertainty listed for a constituent is based on judgment and represents an evaluation of the combined effects of method imprecision, possible systematic errors among methods, and material variability. (No attempt was made to derive exact statistical measures of imprecision because several methods were involved in the determination of most constituents.)

Gaithersburg, MD 20899
April 21, 1986

Stanley D. Rasberry, Chief
Office of Standard Reference Materials

(Over)

PLANNING, PREPARATION, TESTING, AND ANALYSIS:

The material for this SRM was provided by Teledyne, Wah Chang Albany, Albany, Oregon. At NBS, the material was chipped, sieved and thoroughly blended.

Cooperative analyses for certification were performed in the following laboratories:

Babcock and Wilcox, Naval Nuclear Fuel Division, Lynchburg, Virginia, S.A. Martin.

Ledoux and Company, Teaneck, New Jersey, S. Kallmann and C.L. Maul.

Oremet Titanium, Oregon Metallurgical Corporation, Albany, Oregon, A.D. Fryer.

Teledyne, Wah Chang Albany, Albany, Oregon, J.H. Schlewitz.

UNC Naval Products, Division of UNC Resources, Inc., Uncasville, Connecticut, R. Orlowski.

Elements other than those certified may be present in this material as indicated below. These are not certified, but are given as additional information on the composition.

Element	Concentration % by Weight
Antimony	(0.0001)
Arsenic	(0.0007)
Gallium	(<0.0001)
Lead	(<0.0005)
Magnesium	(<0.0001)
Phosphorus	(0.001)
Silicon	(0.006)
Uranium	(<0.0002)
Vanadium	(<0.003)
Zinc	(<0.005)
Fluorine	(<0.001)
Sulfur	(0.003)

The overall coordination of the technical measurements leading to certification was performed under the direction of J.I. Shultz, ASTM/NBS Research Associate.

The technical and support aspects involved in the preparation, certification and issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by R.E. Michaelis, R. Alvarez, and W.P. Reed.